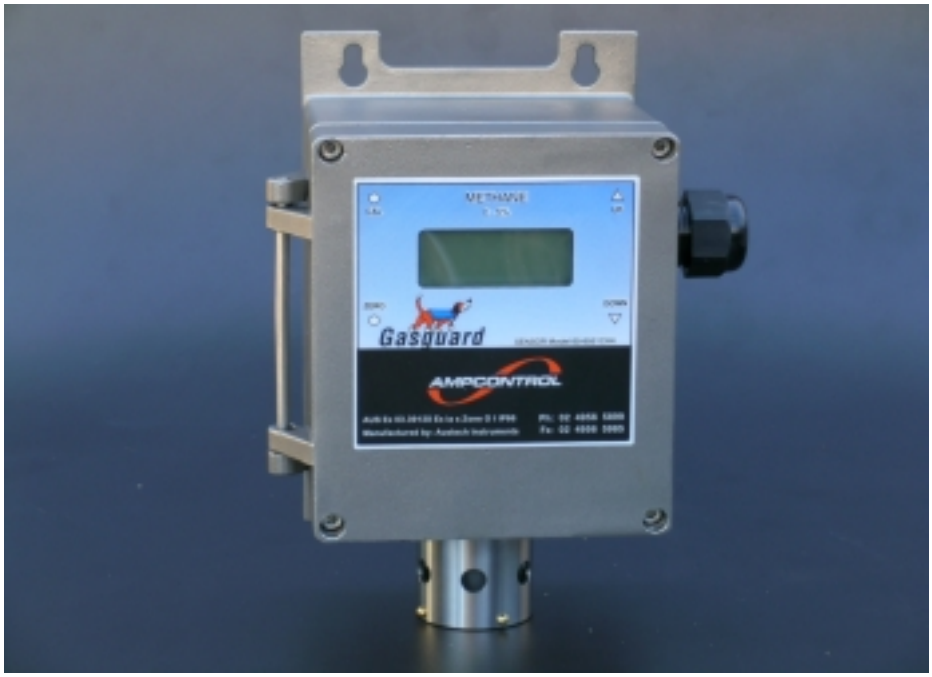
SENSOR UNITS



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USER MANUAL

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Ampcontrol further reserves the right to alter the specification of the system and/or manual without obligation to notify any person or organisation of these changes.

Before You Begin

We would like to thank you for purchasing the Ampcontrol Gasguard Products. To become completely familiar with this equipment and to ensure correct operation, we recommend that you take the time to read this user manual thoroughly.

CRN: 5119

IMPORTANT WARNINGS AND ADVICE

1. **The sensors should not be stored in areas that contain solvent vapours. Some of these vapours are known to create false "high" zero points and may even damage the sensor electrodes. Similarly, the sensor should not be exposed to high levels of solvent vapours while in operation.**
2. **This equipment has been designed to detect hazardous gases and vapours and to give warning before they reach dangerous conditions. In order to ensure that the equipment will warn of dangerous situations it is essential that the instructions in this manual be read, understood and followed. It is further stressed that the effectiveness of the device depends heavily on the user who is responsible for its correct application, use and regular maintenance.**
3. **During start up, electrochemical sensors often require loop currents in excess of 20mA. The Ampcontrol toxic-gas sensors described herein are limited to a maximum of 30mA. It is essential that the circuit into which they are connected is capable of delivering at least 30mA without compromising either Intrinsic Safety (if applicable) or the specifications of monitoring equipment.**
4. **Note the maximum gas to be applied to any sensor, as per Table 2.1. Maximum levels must not be exceeded.**

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SECTION 1 - DESCRIPTION

1.1 Introduction

This manual provides commissioning, calibration and maintenance instructions for the Ampcontrol Gasguard Sensor Units. Because the units are passive monitoring devices, operating instructions are not applicable to this equipment.

The chemical symbols for toxic-gases and oxygen are used extensively throughout this manual.

The Gasguard sensor units consist of two types:

- Electrochemical
  - ❖ Oxygen Sensor (O_2)
  - ❖ Carbon Monoxide Sensor (CO)
  - ❖ Hydrogen Sulphide Sensor (H_2S)
- Catalytic
  - ❖ Methane Sensor (CH_4)

For which the following instructions and diagrams are included in this manual:

- Toxic-gas or oxygen sensor cells
- Amplifier PCB Description
- Sensor Wiring Diagrams
- Stainless Steel Housing Enclosure Dimensions

Unique part numbers in accordance with the following scheme identifies the sensor unit configurations:

- Part Number 65-6550XXX series is for Electrochemical sensor units.
- Part Number 65-6551XXX series is for Catalytic sensor units.

Note:

In the part numbers listed above, XXX represents the chemical symbol for the gas detected by the unit. For example, 65-6550O2 is the part number for an Electrochemical unit designed to detect Oxygen (O_2) sensor.

1.1.1 Gasguard Sensor Unit Dimensions

Figure 1.1 shows the top and front view of the Catalytic and Electrochemical Sensor.

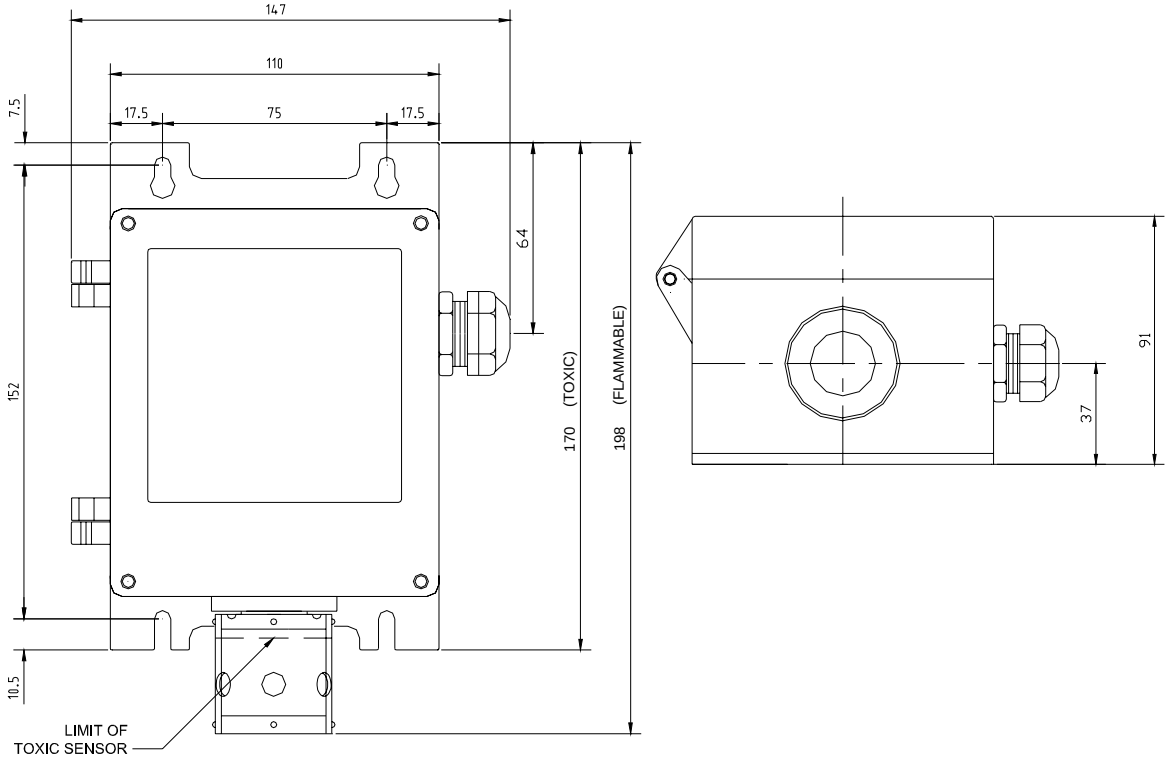

Figure 1.1 Dimensions - Catalytic and Electrochemical Sensor

1.2 Sensors

1.2.1 Toxic Gas Sensors

Electrochemical toxic-gas sensor cells operate on a principle similar to that of a battery. The gas coming in contact with small electrodes at the surface of the sensor cell causes the sensor to generate a small electrical current. The type of gas and its concentration at the sensor surface determines the electrical output of the sensor.

The three-electrode toxic-gas sensor consists of a sensing electrode, a counter electrode and a reference electrode separated by a thin layer of electrolyte. The central feature of the toxic-gas sensor is the gaseous diffusion barrier. This limits the flow of gas to the sensing electrode and ensures that the electrochemical activity of the electrode exceeds the amount of gas with which it has to deal.

Gas diffusing to the sensing electrode reacts at the surface of the electrode either by oxidation or by reduction, depending on the gas the sensor cell is designed to detect. Electrode materials specially developed and designed for the intended gas catalyse reactions.

1.2.2 Oxygen Sensor

The Oxygen Sensor is a two-electrode device. Oxygen passes through a permeable membrane and reacts with the electrolyte. An output voltage is then developed which is directly proportional to the partial pressure of the oxygen.

1.2.3 Methane Gas Sensor

The Methane Gas Sensor, which operates on the catalytic combustible gas detection principle, is a small platinum element coated in a catalyst. Electrical current is passed through the platinum wire and the potential of the catalytic element is monitored by a simple Wheatstone Bridge arrangement. Combustible gases, once in contact with the heated catalytic surface of the measuring element, react and cause the surface temperature of the element to rise. Any increase in temperature affects the resistance of the platinum wire, causing a small shift in potential across the Wheatstone Bridge proportional to the concentration of the combustible gas. The sensor is temperature compensated and provides a 4/20mA linear output.

1.2.4 Sensor Cell Specifications

Specification data for the sensor units is contained in Table 1.1. The table shows specific response data for each of the types of sensor cells.

GAS	H_2S	CO	O_2	CH4
Maximum Range	100ppm	300ppm	25%	5%
Max. Gas Applied		500ppm	30%	6%
Overall Linearity	<5% FS	<5% FS	<5% FS	<±5% FSS
Maximum Drift	<10 % per 6 mth	<10 % per 6 mth	<5 % signal loss per year	Zero, <±5% FSS per month Sensitivity, <±5% FSS per month
Repeatability	±1% of Reading	±1% of Reading	±1% of Reading	±1% of Reading
Response Time (T90)	<30 Seconds	<30 Seconds	<=15 Seconds	<15 Seconds (Typical)
Sensing Element Life	>3 Years in clean Air	>3 Years in clean Air	>2 Years in Air	>2 Years
Temperature Range ºC	-40 to +50	-40 to +50	-20 to +50	-10 to +50
Resolution	<0.3ppm	<3ppm	0.02%	0.10%
Humidity (RH non-condensing)	50 – 90%	50 –90%	0 – 99%	0 – 95%
Storage Temperature			0 to +20ºC	

Table 1.1 Sensor Cell Specification Data

1.2.5 Sensor Cell Cross Sensitivity

The cross sensitivity of the various sensor cells to commonly occurring gases are listed in Section 1.6, Page 5.

The Oxygen Sensor Cell is slightly cross sensitive with CO_2 (Carbon Dioxide), the presence of CO_2 creates an offset in the oxygen sensor reading depending on the CO_2 concentration.

CO_2 CONCENTRATION	OXYGEN SENSOR OFFSET
5%	2.2%
10%	3.5%

Table 1.2 Oxygen Sensor Offset

For the Carbon Monoxide (CO) Sensor Cell, the cross-sensitivity to other gases such as Hydrogen Sulphide (H_2S), is significantly reduced by use of a filter, which is part of the sensor cell. In normal use the filter is designed to outlast the sensor cell; however it is not capable of withstanding continuous high levels, such as 100ppm, or more of interfering gases.

Methane gas sensors positively detect the presence of all flammable gases. It is unable to distinguish the difference between gases so the sensor will display a reading if any flammable gas is present.

Caution: Exposure to Hydrogen Sulphide gas (H2S) may effect the performance of the **Methane** sensor (i.e. it may reduce its sensitivity). If the sensor is exposed to H2S gas then it should be **Recalibrated.**

1.2.6 Humidity

Sensors can operate in a condensing atmosphere. In such an environment, a thin film of water forms across the membrane, effectively sealing it and stopping the passage of gas into the electrolyte. On evaporation of this water the sensor usually resumes normal operation. Sensors cannot operate continuously below 15% R.H. because the electrolyte dehydrates. Above 90% R.H. the sensor absorbs excess water vapour and after some time, may appear to leak. Provided the exposure to these extremes of humidity has not been for a long period, the sensors can recover when exposed to R.H. in the range 15% to 90%.

1.2.7 Pressure Effects

The toxic-gas sensors do not exhibit a permanent response to changes of pressure. However, when exposed to sudden pressure changes in the presence of a measured gas they give a peak output that decays after a few seconds. The oxygen sensor reacts to pressure changes. It responds to pressure on a directly proportional basis and therefore, should not be exposed to varying pressures.

1.2.8 Operational Restrictions.

For proper operation, toxic-gas sensors require a small supply of oxygen to the counter and reference electrodes to allow correct operation. The oxygen is normally provided in the sample stream by air diffusing to the front of the sensor or by diffusion through the sides and rear of the sensor. A few thousand PPM of oxygen is normally sufficient. Continuous exposure to an anaerobic sample gas may cause the sensor to malfunction in spite of the rear oxygen access paths. Because of the need for some oxygen access, sensors should not be totally immersed in an anaerobic gas mixture. Since calibration normally involves exposing the sensor to gas for a relatively short period, the calibration gas need not contain oxygen. Sufficient oxygen is supplied from ambient air through the side and back access paths for a limited time.

1.2.9 Poisoning of Sensors (Contamination)

High levels of or long exposure to certain compounds may poison the catalytically active detector filament thereby reducing or destroying its sensitivity.

Among these compounds are halides, sulphur compounds, leaded petrol, silanes, silicates and other produces with silicon. Products such as aerosol sprays, polishes, waxes and lubricants with silicones and non-catalysed silicone rubbers such as “silastic”, phosphate esters, hydraulic fluids – all damage catalytic sensors.

1.3 Amplifier PCB

The purpose of the Amplifier PCB is to convert the low-level electrical output of the sensor into a signal capable of driving various types of external indicator equipment such as the Ampcontrol Gasguard 4 Channel Controller.

The Amplifier PCB requires a 12VDC operating voltage and transmits a signal of 4/20mA. At the lower end of the range, the 4mA signal level indicates a zero gas concentration. At the upper end of the range the 20mA signal indicates that the sensor cell has detected a full span gas concentration. **ZERO** and **SPAN** adjustment reed relays located on the PCB are used for calibration of the sensor.

1.3.1 Electrochemical Amplifier PCB

The amplifier is designed as a 2-wire, remote transmitting amplifier circuit for connection between a Carbon Monoxide sensor cell, Hydrogen Sulphide sensor cell or oxygen sensor cell and the external indicating equipment.

The amplifier electronics is powered from the 4/20mA loop current and amplifies the current generated by the sensor cell when gas is detected.

1.3.2 Catalytic Amplifier PCB

The amplifier is designed as a 3-wire, remote transmitting amplifier circuit for connection between a methane sensor cell and the external indicating equipment.

1.4 Enclosures

1.4.1 Stainless Steel Housing

The standard Stainless Steel Housing, Part Number 23-6550LB (shown in Figure 1.1, Page 1), incorporates the Sensor Cell and Amplifier PCB. The housing is robust and is corrosion resistant. It is suitable for almost all applications and provides for easy installation and maintenance. When properly used it gives many years of efficient operation.

1.5 Sensor Wiring Assembly

Electrical connections for the various sensor cells are by means of connector pins on the top surface of the sensor cells. A Sensor Wiring Assembly provides the electrical interface between the sensor cell and the Amplifier PCB. The sensor cell plugs into the Connector Board on the Sensor Wiring Assembly and the wiring harness connects to the Amplifier PCB (Connector J6 – Electrochemical / Toxic, Connector J4 – Catalytic / Methane).

A second wiring assembly connects the supply and signal connections from the incoming terminals to the Amplifier PCB (Connector J7 – Electrochemical / Toxic, Connector J5 – Catalytic / Methane).

See Figures 2.1 and 2.2 Section 2.4, Page 8 for wiring details.

1.6 Specifications

The following table contains general operational specifications for all Gasguard Sensor Units. Table 1.3 should be used in conjunction with Table 1.1, which shows specifications for each of the various types of sensor cells.

1.6.1 Sensor Unit Operational Specifications

FACTOR	SPECIFICATION	
Detection Method	**Electrochemical**	**Catalytic**
Output	4-20mA	4-20mA
Accuracy	± 2% of Reading (O_2) ± 5% of Reading (All Others)	± 5%
Repeatability	± 1% of Reading	± 1% of Reading
Zero Drift (30 Day Period)	< 2% of Full Scale	< 2% of Full Scale
Temperature Range (Continuous)	See Table 1.1	See Table 1.1
Humidity Range	See Table 1.1	See Table 1.1
Power Requirement	12 VDC at Amplifier; 4–20mA Loop-Powered	12 VDC at Amplifier
Sensor Cell Estimated Life	>2 Years in Clean Air	>2 Years in Clean Air
Warranty	1 Year	1 Year
Recommended Storage Temperature	0 to 20°C	0 to 20°C

Table 1.3 Sensor Unit Operational Specifications

1.6.2 Cross Sensitivity Data

Gas	Concentration	Reading (ppm)
Acetic Acid	Sat. vapour	0
Alcohols (i.e. IPA)	1025ppm	0
Ammonia	100ppm	0
Carbon Dioxide	10%	0
Chlorine	1ppm	0
Gasoline Vapour	% range	0
Hydrogen	3000ppm	1000
Hydrogen Sulphide	20ppm	0
Nitrogen Dioxide	10ppm	0
Nitrogen Oxide	100ppm	25
Sulphur Dioxide	20ppm	0

Table 1.4 Cross Sensitivity Data for Carbon Monoxide Sensor

Gas	Concentration	Reading (ppm)
Ammonia	100ppm	0
Carbon Dioxide	5000ppm	0
Carbon Monoxide	100ppm	<2
Chlorine	10ppm	0
Ethylene	500ppm	0
Hydrogen	1%	<0.2
Hydrogen Cyanide	15ppm	1
Isopropanol	600ppm	0
Methane	2.2%	<-0.1
Methanol	1000ppm	0
Nitrogen Dioxide	10ppm	<-2
Sulphur Dioxide	20ppm	<3

Table 1.5 Cross Sensitivity Data for Hydrogen Sulphide Sensor

Gas	Concentration	Reading (% v/v)
Acetic Acid	4.0%	1.45
Acetone	2.6%	2.5
Ammonia	15%	6.25
Benzene	1.2%	2.0
n-Butane	1.8%	2.5
Carbon Monoxide	12.5%	4.0
Chlorobenzene	1.3%	1.7
Ethanol	3.3ppm	2.95
n-Hexane	1.2%	2.0
Hydrogen	4.0%	4.0
Methane	5.0%	5.0
Methanol	6.7%	4.25
Methyl ethyl kentone	1.9%	2.0
n-Pentane	1.4%	2.0
Propane	2.1%	2.5
Toluene	1.2%	2.0

Table 1.6 Cross Sensitivity Data for Methane Sensor

SECTION 2 - INSTALLATION

2.1 Installation Guidelines

To ensure continued reliable operation of the sensor system, the following installation guidelines should be observed:

- Select a suitable central location for mounting with good access. The location should be as clean and dry as practicable and at a temperature as close 20°C as practicable.
- Mount the sensor unit in a position that minimises the risk of mechanical damage.
- Mounting should be to a vertical surface, allowing for easy wiring access and subsequent servicing. It is essential that the sensor be positioned to take into account the expected flow of the gas to be measured.

2.2 Relative Density

The relative density or buoyancy of the gas or vapour with respect to air is a very important consideration. This determines its propensity to rise or fall when released into the atmosphere.

Gases or vapours with buoyancy less than air will tend to rise from the source of release.

Conversely, gases or vapours heavier than air will tend to fall and accumulate in concentrations for long periods of time. Normal air movements in and around such gas concentrations will have the inevitable effect of producing zones of highly toxic mixtures.

This knowledge of the characteristics of the gas assists when determining the location of the gas sensor. See Table 2.1 for gas density.

For monitoring of heavier-than-air gases, mount the sensor as close as practical to the floor or ground. For monitoring of lighter than air gases, install the sensor unit as high as practical.

Gas	Density
Hydrogen	**LIGHTER**
Ammonia	
Hydrogen Cyanide	
Diborane	
Carbon Monoxide	
Carbon Dioxide	**HEAVIER THAN AIR**
Nitric Oxide	
Oxygen	
Silane	
Phosphine	
Hydrogen Sulphide	
Ethylene Oxide	
Hydrogen Chloride	
Hydrogen Fluoride	
Fluorine	
Ozone	
Sulphur Dioxide	
Chlorine	
Nitrogen Dioxide	
Germane	
Arsine	
Hydrogen Bromide	
Phosgene	

Table 2.1 Gas Density

2.3 Cable Resistance Considerations

The Electrochemical Amplifier PCB requires no other operating power except the 4-20mA-loop current. The voltage available at the amplifier must be 12VDC and have a maximum cable resistance of 150 Ohms (See Table 2.2).

Conductor Area mm	Diameter Mm^2	Nearest SWG	Loop Resistance Ohms/100M
2.0	1.60	16	1.72
2.5	1.78	15	1.38
3.0	1.95	14	1.14
3.5	2.11	13	0.98

Table 2.2 Nominal Resistance Values for Wire Sizes

2.4 Wiring

Figures 2.1 and 2.2, Page 8 show the schematic wiring of the Toxic and Flammable Sensor Units. The amplifier PCB is fitted with plug/screw connectors. This allows the connector to be unplugged from the PCB to attach the wiring and then be plugged back into the board.

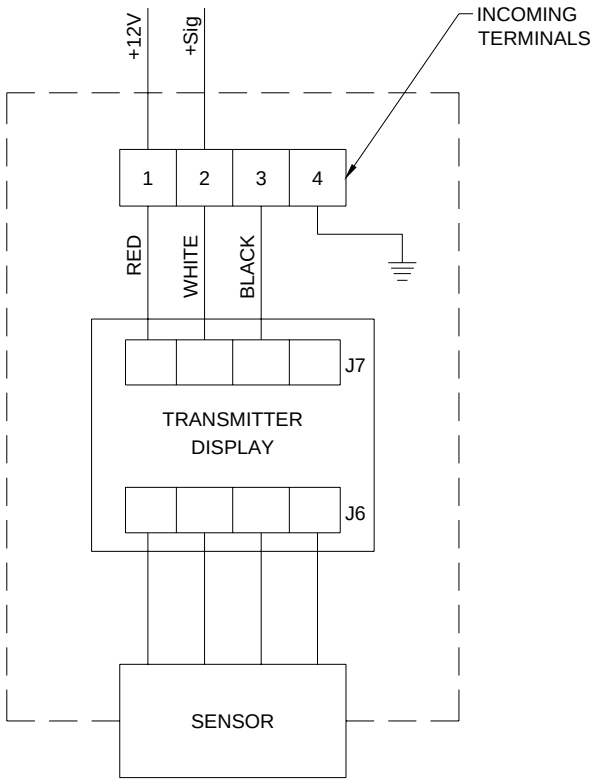

Figure 2.1 Electrochemical Sensor Unit Wiring Diagram

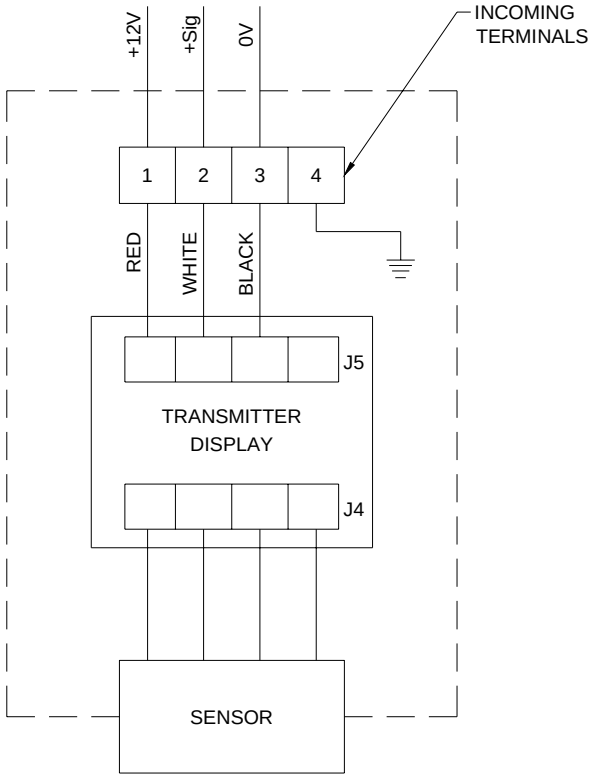

Figure 2.2 Catalytic Sensor Unit Wiring Diagram

SECTION 3 - COMMISSIONING AND CALIBRATION

3.1 Introduction

Commissioning is the performance of initial checks, adjustments and calibration prior to placing the system in operation for the first time. Calibration, however, is not limited to performance of commissioning. Calibration is also performed throughout the life of the system on a periodic basis and after major repairs to the system.

During commissioning and subsequent re-calibration, it is vital to ensure that procedures are followed to prevent any abnormal sensor signal from initiating any fault, warn or alarm status indicator, or equipment control function. Consult the relevant control unit manual for details of how to do this.

The instruments supplied as complete units have already been calibrated at the factory prior to delivery. However, before putting the system into operation, it is important to check the calibration. This is especially important if the instruments are commissioned some time after delivery.

3.2 Preliminary Checks.

Perform the following preliminary checks:

a) Verify that all connections are correct and complete as detailed in Section 2.

b) Apply power to the system.

c) Check that voltage applied to the Amplifier PCB is 12VDC.

3.3 Gasguard Display Panel

To assist in fault finding the Gasguard display panel will indicate the following:

Display	Description
-777	There is no sensor plugged into the amplifier
-888	Sensor is faulty/expired
-999	Amplifier needs reconfiguration
Er	Error has occurred
CAL	Calibration mode initiated (display blinks when in calibration mode)
SAU	Calibration settings have been saved
PU	Powering Up

Table 3.1

3.4 System Calibration

Before the start of calibration, the system should be left in a powered-up operational (no fault) state to allow the gas sensors to stabilise. However, if such a delay is not practical, observe the meter indications with the sensor in a gas free atmosphere, until there is no appreciable meter movement for a period of time. The system should then be sufficiently stable to allow calibration.

- Calibration of sensors can only be achieved by using the appropriate gas. That is the gas that the sensor is designed to detect. A calibration gas should ideally be about 50% of full scale of the relevant monitor. However, sometimes, due to practical restraints and safety reasons, the gas may be 20% or less of full scale. While calibration at such a low level is not ideal, the resulting inaccuracies are usually within the safety tolerances for the system.
- For toxic-gas detection, if reading inaccuracies cannot be avoided, they should always be on the high side for safety reasons. For example, with an actual gas density of 50 PPM, the system may safely display 53 PPM. The opposite is true of oxygen detection; the inaccuracies should always be on the low side. For example with an actual oxygen density of 20.9% in volume of air, the system may safely display 20% Vol. As calibration gases have a tolerance, it is advisable to adjust the system to the highest reading (toxic-gases) or lowest reading (oxygen) in this tolerance to maintain an assured safety margin.
- Calibration gas should be applied to the sensor at a rate of approximately 0.5 to 1.0 litre per minute. It is not advisable to leave the gas flow on the sensor any longer than is needed for the output to stabilise and the calibration adjustment to be made. Note that, with some gases, the sensor takes considerable time to reach zero after the gas has been removed. While the output should drop to less than 10% of the applied gas level within several minutes, the last drop to zero could take hours under some conditions. Because of this, do not readjust the zero for some hours after span calibration.

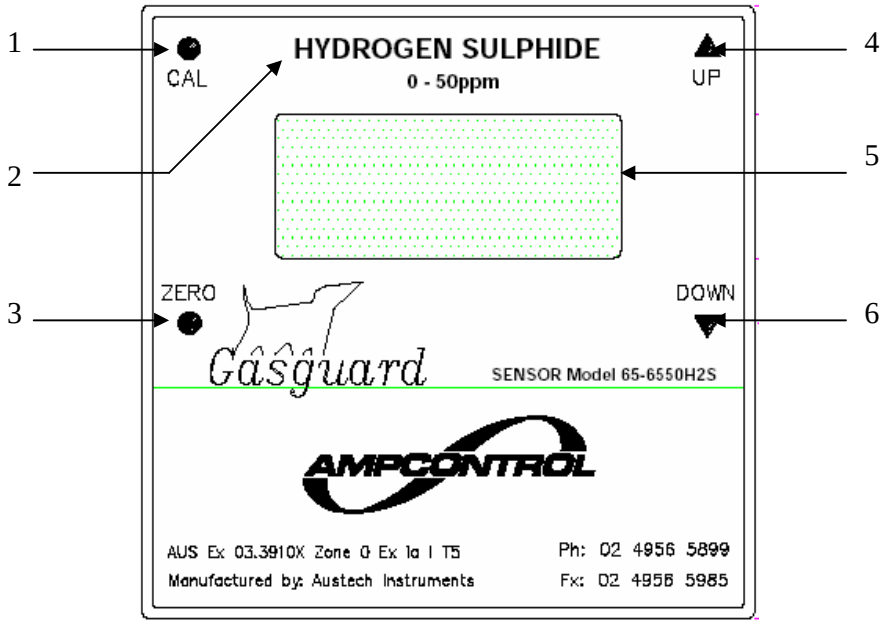

Figure 3.1 Gasguard Control Panel

3.5 Zero Calibration.

Perform Zero Calibration as follows:

a) Ensure that the sensor is in a fresh air environment, or apply fresh air to the sensor via the calibration plug, in the case of oxygen apply High Purity Nitrogen via the calibration plug.

b) Place the magnetic tip of the calibration pen over the CAL symbol (1) for 5 seconds.

c) Now that the CAL mode is accessed place the magnetic tip over the ZERO symbol (3) for 5 seconds.

d) The display should have a zero reading. To save the zero setting place the magnetic tip over the CAL symbol (1) for 5 seconds.

e) The sensor display (5) will show SAV to confirm that it has saved the zero setting.

3.6 Span Calibration.

Perform Span Calibration as follows:

a) Apply calibration gas to the sensor at the rate of 0.5 to1 litre per minute. Use a calibration gas of the same density as the most critical measurements to be made. If that is not possible, use gas of between 20% and 50% of the instrument range. For oxygen sensors, ensure the sensor is in fresh air, or apply a gas with an oxygen content of approximately 21 %.

b) To adjust the display so that it reads the correct value for the gas applied enter Calibration Mode by placing the magnetic tip of the Calibration pen over the CAL symbol (1) for 5 seconds.

   Place the magnetic tip of the pen over the UP symbol (4) to increase the display reading and over the DOWN symbol (6) to decrease the display reading.

c) Place the magnetic tip over the CAL symbol (1) for 5 seconds once the display reads the correct value for the gas applied.

d) Shut off the calibration gas. If the Zero calibration is to be checked, wait for the sensor to stabilise before proceeding.

SECTION 4 - MAINTENANCE

4.1 Periodic Maintenance

Periodic maintenance consists mainly of scheduled checks to ensure the instrument remains in adjustment and gives the required response to sampled gas. The following maintenance schedule is recommended.

Daily:

Verify operation by visually checking the reading on the respective control unit/monitor.

Investigate any abnormal deviations from Zero reading.

Monthly:

a) Check the Zero reading in fresh air or by accurate measurement of ambient air for a non-zero point; readjust as necessary.

b) Check the Span calibration on a known sample of toxic gas in air. Readjust as necessary.

As Required:

Replace the toxic-gas sensor whenever it becomes impossible to adjust to Zero, or when the Span adjustment is insufficient to enable adjustment to the calibration gas value. If this occurs, recalibrate the unit as described in Section 3 Commissioning and Calibration.

Following Power Removal:

If power has been removed from the unit for a long period of time, a re-commissioning check should be carried out.

4.2 Corrective Maintenance.

During fault isolation it is vital to ensure that suitable procedures are followed to prevent any abnormal sensor signal from unintentionally operating any fault, warn or alarm status indicator, or equipment control function. Consult the relevant control unit manual for details as to how to do this.

There are only two active replaceable units in the sensor system, the Amplifier PCB and the gas sensor. Therefore, fault isolation is limited to the following possible faults and remedies.

No 4/20mA Output:

a) Check that voltage applied to the Amplifier PCB is 12VDC and that polarity is correct. If not correct, rectify.

b) Check for loose plug and terminal connections.

c) If Step a) above is correct and the problem persists, replace the Amplifier PCB.

Sensor cannot be Spanned or Zeroed:

a) Check that voltage and polarity applied to the amplifier is correct.

b) Check for loose plug and terminal connections.

c) If the above is correct and the problem persists, replace the sensor.

d) If the sensor still cannot be Spanned or Zeroed, replace the Amplifier PCB.

Erratic Output:

a) Check that voltage and polarity applied to the Amplifier PCB is correct. Also, check that there are no severe voltage swings, indicating an intermittent fault in the field wiring or control unit.

b) Check for loose plug and terminal connections.

c) If the above is correct and the problem persists, replace the sensor.

d) If the output is still erratic, replace the Amplifier PCB.

SECTION 5 - EQUIPMENT LIST

65-6551-CH4	Methane Gas Sensor c/w Display
65-6551-CH4-R05	Methane Gas Sensor c/w Remote Head on a 5m lead and Display
61-6551-CH4-R10	Methane Gas Sensor c/w remote head on a 10m lead and Display
65-6550-CO-50	Carbon Monoxide Gas Sensor c/-Display – 0-50ppm
65-6550-CO-100	Carbon Monoxide Gas Sensor c/-Display – 0-100ppm
65-6550-H2S	Hydrogen Sulphide Gas Sensor c/w Display
65-6550-O2	Oxygen Gas Sensor c/w display
33-6529L	Replaceable Filter for toxic sensors
33-1033	Replacement Filter Membrane
75-6550-V4-LB	Replacement Toxic Amplifier PCB
75-6551-V4-LB	Replacement Catalytic Amplifier PCB
65-6511XXX	Replacement Toxic Sensor Cell (XXX denotes gas type)
65-0660L	Replacement Methane Sensor Cell
13-7000LC	Calibration Pen

New South Wales
Department of Mineral Resources

COAL MINES REGULATION ACT, 1982

NOTICE OF APPROVAL

Approval No.: MDA GD 5056
File No.: C04/0211
Date: 25/5/2004

Gasguard Sensor Units

Pursuant to the provisions of Clause 127 Part 8 Monitoring and detecting equipment Coal Mines (Underground) Regulation 1999, I hereby approve as an automatic methane detector the Gasguard Sensor Units supplied by Ampcontrol Pty Ltd, subject to the following conditions:

1. There shall be no variation in design, construction, or performance from that of the samples tested by the Mine Safety Technical Services and reported in test report nos. 04/275, 03/1346 and TestSafe Certificates of Conformity AUS Ex 03.3192X and AUS Ex 03.3910X issue date 21/5/2004, unless approval for modification has been obtained. Any repair that may affect the instrument's explosion protection properties shall be carried out at a workshop registered for the purpose.

2. Prior to being placed in service each gas sensor/transmitter unit shall be tested for accuracy and calibrated by a NATA accredited test authority and a NATA endorsed certificate supplied to the mine.

3. The supplier shall ensure that the apparatus supplied complies with all relevant requirements of the Occupational Health and Safety Act.

4. The employer(s) shall ensure that the apparatus is used in compliance with the Occupational Health and Safety Act.

5. At each mine where the instrument is used the Manager shall ensure that the instrument is maintained in accordance with the current Australian Standard AS2290.3 electrical equipment for coal mines - Maintenance and overhaul Part3 Maintenance of gas detecting and monitoring equipment.

6. The Chief Inspector of Coal Mines may vary or revoke this approval at any time.

7. A copy of this notice shall be supplied with each apparatus supplied to a mine.

R. Regan
CHIEF INSPECTOR OF COAL MINES

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